Feedback to the EOSC Interoperability Framework

Abstract
This document presents the feedback from the EOSC-hub project to the draft for community consultation of the EOSC Interoperability Framework. The feedback has been developed by the EOSC-hub Technology Committee and endorsed by the EOSC-hub Project Management Board.

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DOCUMENT LOG

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v.0.2	15/09/2020	Final draft	EOSC-hub Technology Committee
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TERMINOLOGY

https://wiki.eosc-hub.eu/display/EOSC/EOSC-hub+Glossary

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1   Introduction

This document presents the feedback from the EOSC-hub project[1] to the draft for community consultation of the EOSC Interoperability Framework. The feedback has been developed by the EOSC-hub Technology Committee and endorsed by the EOSC-hub Project Management Board.

1.1 Call for feedback

From the EOSC Liaison Platform post:

Achieving interoperability within EOSC is essential to federate services and provide added value for users.

The draft EOSC Interoperability Framework identifies general principles and organises them into the four layers: technical, semantic, organisational and legal. The framework also contains a proposal for how the management of FAIR Digital Objects should be done in the context of EOSC.

The initial draft has been developed by members of the FAIR and Architecture Working Groups. The authors conducted an extensive review of related literature and interviewed key stakeholders from ERICs, ESFRI projects, service providers and research communities. This helped to identify problems and requirements in each aspect of interoperability to provide recommendations for EOSC. Legal issues will be included in the next version, based on recommendations from a commissioned study.

Feedback are needed to iterate the final version due in October, specifically:

- *Is this what you expected to see or are some things missing?*
- *Are the concepts clear or do some aspects need further clarification?*
- *Are the minimum requirements and recommendations appropriate?*
- *Is it clear who is responsible for what and how this should be followed?*
- *As a service provider, could you conform with / implement the framework?*
- *Is the model for FAIR Digital Objects sound?*
- *What other feedback and comments would you like to offer?*

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[1] https://www.eosc-hub.eu/

2   EOSC-hub feedback

2.1 Q1: Is this what you expected to see or are some things missing?

- The current Interoperability Framework (IF) seems to omit plans for the promotion of recommended standards and guidelines for their adoption in the implementation roadmap of the EOSC.
  - *Recommendation*: We recommend the extension of the IF to integrate and define strategic actions for the increased adoption of the IF by relevant stakeholders.

- The current document does not outline how the IF will evolve in the future.
  - *Recommendation*: add an innovation roadmap, that takes into account existing guidelines and best practices emerging from EOSC projects such as the EOSC-hub interoperability guidelines[2], the OpenAIRE guidelines[3] and the FAIRSFAIR FAIR Data Policies and Practices[4], making sure that EOSC is leveraging as much as possible community good practices and recommendations.

- Analysis of user requirements done in previous EOSC projects (EOSC-pilot, EOSC-hub, etc.) led to the identification of a much wider set of interoperability problems, and related needs, to address in respect to those presented in this paper (with an apparent, implicit focus on AAI, Data semantic interoperability and PID policy). These include the access to large and heterogeneous computing facilities, the establishing of compute federations, the deployment of dynamic clusters and/or use of containers (Dockers, Kubernetes) in multiple providers, interoperability between compute services (e.g. Notebooks) and data management solutions, etc.[5][6][7][8].
  - *Recommendation:* extend the set of requirements to include aspects related to data analysis and processing.

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[2] https://www.eosc-hub.eu/technical-documentation#overlay-context=

[3] https://guidelines.openaire.eu/en/latest/

[4] https://www.fairsfair.eu/fairsfair-open-consultation-fair-data-policies-and-practices

[5] EOSC-Pilot scientific demonstrators - D5.6 Evaluation Report of service pilots: https://eoscpilot.eu/content/d56-evaluation-report-service-pilots

[6] EOSC-hub Thematic Services - D7.2 First report on Thematic Service architecture and software integration: https://www.eosc-hub.eu/deliverable/d72-first-report-thematic-service-architecture-and-software-integration

[7] EOSC-hub Competence Centers - D8.1 Report on progress, achievements and plans of the Competence Centres: https://www.eosc-hub.eu/deliverable/d81-report-progress-achievements-and-plans-competence-centres

[8] EOSC-hub Community Requirements Database: https://wiki.eosc-hub.eu/display/EOSC/Community+requirements+DB

- The IF should also include an interoperability model to federate resource providers in EOSC, defining the interfaces each provider needs to comply with in order to interoperate with the EOSC core services (accounting, monitoring, helpdesk, etc. in addition to AAI). As an example, an interoperability standard to account for the use of resources in a consistent, coherent - and verifiable - manner is a *de facto* prerequisite for broader adoption of the Virtual Access instrument as a pillar of EOSC sustainability. First results on this area have been achieved by the EOSC-hub project[9] and related interoperability specifications are currently in open consultation[10].

  - *Recommendation:* define standards and interfaces to interoperate resource providers with the EOSC core services.

- To facilitate rapid and broad adoption of the IF, references to and comparative analysis of other interoperability models used in Europe would be of great value. As an example, comparison with the IDS model for interoperability from the GAIA-X project would be welcome.

  - *Recommendation:* Analysis of other interoperability models (e.g. IDS[11] from GAIA-X[12]) should be considered.

2.2 Q2: Are the concepts clear or do some aspects need further

- We support the choice of the generic/high-level approach of the EOSC Interoperability Framework (IF) and relying on the European Interoperability Framework[13] as the main reference model to cover all the interoperability aspects.

- We suggest maintaining the high-level approach in the whole introductory part and separating it from the vertical, in-depth analysis of specific interoperability topics and technical aspects.

  - *Recommendation:* more technical concepts (e.g. section *1.1.2 FAIR principles and the role of Interoperability*) should be presented later in the document.

- The glossary section (1.1.4) is very useful, and the reader should be aware of its existence as quickly as possible after picking up the document.

  - *Recommendation:* present the terminology adopted earlier in the document.

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[9] Technical Architecture and Interoperability Guidelines for EOSC Federation services: https://wiki.eosc-hub.eu/display/EOSCDOC/Federation+services

[10] https://www.eosc-hub.eu/news/have-your-say-eosc-hub-proposals-technical-specifications-helpdesk-accounting-and-monitoring

[11] https://www.internationaldataspaces.org/

[12] https://www.data-infrastructure.eu/GAIAX/Navigation/EN/Home/home.html

[13] https://ec.europa.eu/isa2/sites/isa/files/eif_brochure_final.pdf

- Section 4 discusses semantic interoperability in a quite comprehensive manner. However, this unfortunately highlights the relative lack of details of other aspects of interoperability (technical, organisational and legal) in the proposed model.
  - *Recommendation:* provide more details on how IF enables technical, organisational and legal interoperability.

2.3 Q3: Are the minimum requirements and recommendations appropriate?

Technical interoperability

- EOSC should - in general - consistently promote the adoption of open/well-known/standard interfaces and community best practices to achieve technical interoperability leveraging on the experience of technology providers, e-infrastructures and user communities. Common and standard ways to describe service interfaces should be available.
  - *Recommendation:* Involve technology providers, e-infrastructures and user communities in a process to select existing open/well-known/standard interfaces to be suggested as EOSC standards and promote them for their wide adoption within EOSC.
- We think that the application interoperability is not fully sufficient to satisfy user needs within EOSC - it would need to be complemented by resource interoperability. In this way, research communities may profit from EOSC by accessing multiple resources from multiple providers (e.g. scaling up their setup using computing resources from more data centers). Currently, they have to use different interfaces to access different providers.
  - *Recommendation:* EOSC should promote the adoption of standards to achieve interoperability also at resource level.
- The technical interoperability is typically addressed by defining development guidelines, official tests, and verification procedures, which define a level of software quality. Although this cannot be explicitly and exhaustively detailed in the document, the spirit of software and service quality must be present. This is an important issue that is going to be considered and instruments to enable users to know the level of quality of the EOSC services should be provided:
  - Recommendation: Define the need to set up a software quality procedure to verify the level of technical interoperability of each EOSC service, providing a few examples.
- Within the technical interoperability, different levels of integration/interoperability can be envisioned to enable tighter integrations between providers willing to adopt their services to the EOSC environment and looser integrations for providers that prefers to participate in EOSC without applying major changes on their services (e.g. commercial providers). A multi-level approach would guarantee more openness and participation to the whole EOSC.

○ *Recommendation:* Different levels of the interoperability in EOSC need to be identified

Semantic interoperability

● Data collections are - as described in the related section of the IF - usually poorly documented, in terms of the metadata that is made available for them. However, not all of the issues can be resolved by only improving metadata documentation.

○ *Recommendation:* for the real interoperability also the data documentation with context and content description is needed (for example codebooks etc.). The context is crucial for the data products and research outputs.

Organisational interoperability

● A lightweight EOSC IT Service Management System (SMS) that deals with all the problems related to the joint offering of services in the federated EOSC environment would ensure a robust and resilient service delivery in the EOSC federated infrastructure with different types of many-to-many relationships between users, providers and clients and already solve the main problems related to the organisational interoperability.

○ *Recommendation:* establishing a lightweight federated EOSC IT SMS. The EOSC IF may leverage the work done by the EOSC-hub project to deliver an EOSC SMS[14] based on the FitSM standards[15].

● As presented in the document, organisational interoperability looks to be only/mainly for the EOSC organisations, not between EOSC and the community. There is mentioned "need of interoperability certification mechanisms for service providers" which is a good suggestion. IDS (International Data Spaces) already have this kind of mechanisms that are already tested with service providers.

○ *Recommendation:* it would be desirable implementing a co-operating model with IDS.

● Services are presented to users in a different manner with heterogeneous information.

○ *Recommendation:* EOSC should encourage presenting services homogeneously, with a basic set of common information (including for example, SLA, Terms of use, etc.).

● EOSC users exploiting more EOSC services should use different support channels to get support.

○ *Recommendation:* An EOSC Helpdesk should be an entry point where it is possible asking for support for all the EOSC services. The EOSC Helpdesk will take care to

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[14] https://www.eosc-hub.eu/eosc-hub-key-exploitable-results/#KER2

[15] https://www.fitsm.eu/

forward user requests to other helpdesks on behalf of the users hiding to them the heterogeneity of the federation.

- There is definitely the need to mention security (i.e. operational security). Specifically, in section 2.3 (organisational interoperability), it would be worth mentioning that the "alignment of processes" (second paragraph) should include security. As a minimum, an organisation should (a) implement sufficient levels of assurance for user authentication, (b) manage services (securing, patching, monitoring, managing software vulnerabilities) appropriate to the risk (a job submission portal would be higher risk than a wiki), (c) have security contacts at an organisational level as well as for individual services, (d) agree to collaborate on resolution of security incidents, (e) participate in security incident response exercises, (f) ensure that services process attributes in compliance with GDPR, (g) communicate internally and externally in an appropriate way (machine readable communication follows interoperation guidelines, incidents are classified and managed according to severity, etc.).

Legal interoperability

- On developing the recommendations on legal interoperability for the next version of the document, data ownership has to be taken properly into account. Indeed, all data is not owned by organisations but also by individual researchers.
    - *Recommendation:* data ownership has to be taken properly into account.

- Item 3.3.1 suggests elements that are missing – a shared AUP, commitments to long term sustainability – which is true, but they do exist in current infrastructures; AUPs are currently being harmonised across infrastructures, and most will have some form of commitment to sustainability, too.
    - *Recommendation:* AUPs themselves should be human readable, lawyer readable, and machine readable. In particular, the AUP itself becomes a Digital Object.

2.4 Q4: Is it clear who is responsible for what and how this should be followed?

- In our opinion, as a next step, the broad involvement and engagement of research communities and other EOSC initiatives is needed to find a consensus and deliver a widely accepted EOSC interoperability model.
    - *Recommendation:* setup an interest group with open participation to enhance the model with input from all the main EOSC stakeholders and deliver a widely agreed interoperability model.

2.5 Q5: As a service provider, could you conform with / implement the framework?

- There are still too many undefined variables to state "[as a service provider, I will conform with the framework]". Prerequisites to implement the framework is that it will be widely accepted and the costs to implement it is reasonable.
  - *Recommendation:* find consensus on the proposed model and keep low the cost for service providers to be compliant.
- Hopefully, the interoperability framework encompasses current and emerging best practices that adaption of the framework should be a natural evolution - it would depend on the details of the implementation of the framework, as the previous comment also suggests.
- Major current service providers (e.g. the large international databases like the ones run at EBI, the worldwide PDB and such) have usually decades of experience of operating data services and are the data entry point for a multitude of end users (the researchers). A bottom model is key here as those internationally recognized and well-established databases may not change their way of operating if the EOSC interoperability framework is not defined in a collaborative manner.
  - *Recommendation:* consult major current service providers to leverage their decades of experience of operating data services for researchers.

2.6 Q6: Is the model for FAIR Digital Objects sound?

- The document presents the FAIR Digital Object (FDO) (section 4) as the adopted design solution to implement the EOSC IF, without analysis and comparison with the state of the art.
  - *Recommendation:* it would be useful presenting an analysis of the pros/cons of the FDO model in the context of its alternatives.
- The document states that the interoperability model based on FDO can cover all the aspects of the interoperability (technical, semantic, organisational and legal), but it describes only the semantic aspects with sufficient detail.
  - *Recommendation:* Describe with more details how the FDO model can guarantee the technical, organisational and legal interoperability and, if needed, identify complementary approaches capable of dealing with aspects the FDO could not cover.
- It is not fully clear in the document what is the current status of the FDO model (e.g. availability of tools implementing the model, degree of adoption, long-term sustainability, etc.).
  - *Recommendation:* it would be desirable that current status and target status are described clearly and separately. Now it is not clear what we already have in the

FDO context, what is missing from the target and what are the major steps to go from the current states to the target (to reach the state where the interoperability is functioning).

- The model for the FDO in the EOSC Interoperability Framework (v1.0), based on the development of the Digital Objects and FAIR concept, is in principle justified, although references to the linked data[16], its applications, projects and standards are missing. There is number of projects involving the linked data, including for example EU Open Data Portal[17]. Additionally, W3C has adopted the Resource Description Framework (RDF) as a World Wide Web Consortium (W3C) specification.
  - *Recommendation:* FAIR Data Objects should take this general development clearly into account in its own development.

- The EOSC IF document states "[*It is important to mention that this document does not provide a concrete recommendation on how such digital objects should be implemented, as this is out of the scope of this document, but only general guidelines to be followed by potential implementations*.]" Because interoperability of the data and other research artefacts is - in the end - fundamentally a practical issue, making a final assessment of the FDO is not possible without real world implementations.
  - *Recommendation:* we suggest to refer to some real implementations of the FDO model to allow technicians, researchers and who else is involved, to test and validate the proposal.

- The FDO model described in the document relies heavily on metadata and vocabularies but omits practice recommendations. Such an approach leaves the recommendations on the theoretical level.
  - *Recommendation:* include examples of how the proposed model could be used in the scientific world.

2.7 Q7 What other feedback and comments would you like to offer?

No other comments.

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[16] https://en.wikipedia.org/wiki/Linked_data

[17] https://data.europa.eu/euodp/en/home

Appendix I. EOSC-hub Technology Committee

Table 1 – EOSC-hub Technology Committee (TCOM) members

Name	Role	Affiliation
Giacinto Donvito	Chair	INFN
Lukas Dutka	Data platforms for processing	CYFRONET
Mark van de Sanden	Data publishing and open data	SurfSARA
Heinrich Widmann	Metadata management and data discovery	DKRZ
Ignacio Blanquer	HTC/HPC Compute	UPV
Enol Fernandez	Cloud compute, containers and orchestration	EGI Foundation
Joao Pina	Software release and Software Quality Assurance	LIP
Diego Scardaci	Federation tools	EGI Foundation
Marica Antonacci	PaaS Solutions	INFN
Marcin Plociennik	Workflows management and user interfaces and data analytics	PSNC
Jens Jensen	Security	STFC
Slavek Licehammer	AAI	CESNET
Licia Florio	AAI	GEANT